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File 95 Infantry Board

REPORT

CONCURRENC

of

The Infantry Board

No. 1846

CARTRIDGE, GRENADE, CALIBER .45, T67;
CARTRIDGE, GRENADE, AUXILIARY, M7

FORT BENNING, GEORGIA

6 AUG 1945

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Office of
THE INFANTRY BOARD

IB-471.94

Fort Benning, Georgia

8 AUG 1945

SUBJECT: Cartridge, Grenade, Caliber .45, T67;
Cartridge, Grenade, Auxiliary, M7.

THROUGH: The Commandant, The Infantry School.

TO: The Commanding General, Army Ground Forces,
Army War College, Washington 25, D. C.

1. Authority and Purpose

a. Authority

2d Ind. GNRQT, 5 May 45, above subject.

b. Purpose

"To determine the practicability of launching rifle grenades from the submachine gun M3. Emphasis will be placed on testing the degree of accuracy obtained and whether or not the recoil is of such violence, that the launching of the grenades from this weapon is impractical. It will be noted, that it will be necessary to machine the muzzle end of the weapon to accommodate the M1 launcher." (2d Ind., par. 1a above)

2. Description of Material

The T67 cartridge is a basic propellant cartridge designed for use with the M3 type submachine guns. The M7 is an auxiliary grenade cartridge used with the T67 cartridge for obtaining longer ranges. For other details see Test No. 1 (page 15) and Appendix B (page 32).

3. Factual Background

a. The subject T67 cartridge was developed at the request of the Office of Strategic Services (letter 00 471.61/3064, 25 Apr 45, Appendix B herewith).

b. "As a result of preliminary tests conducted by Aberdeen Proving Ground to determine the optimum of firing of the M3 Submachine Gun launching rifle grenades, it appears that the subject gun may have application as a weapon suitable for this purpose. (2d Ind., GNRQT, par. 1a above)

4. Facts indicated by Tests (for details see appended Record of Test).

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a. Cartridge details see Test No. 1.

b. Ranges obtained when firing grenades.

Type of grenade	W/T67 cartridge only	W/T67 cartridge and M7 cartridge	Max. range (yds)	Elev. (deg)	Average Dispersion (yds) Range	Defl
M9A1 (HEAT)	x		136	30	8.3	.3
do		x	222	45	2.4	5.1
M19 (WP)	x		93	43	3.2	2.5
do		x	152	43	4.7	9.6
Mk II (w/M1 projection adapter)	x		114	45		
do		x	128	35		

Type of pyrotechnic				Height (yds)
T8E1	x	177	43	
M17A1	x		90	152
T40	x		90	167
T12	x		90	53

(Test No. 2)

c. Recoil when firing from the shoulder is excessive. When fired from hip recoil is not as pronounced as when firing from shoulder. In all firing the firer received powder burns and cuts on hands and face, especially when using the auxiliary cartridge or the pyrotechnics with integral boosters. The M3 SMG will not withstand the recoil of firing grenades, other than the M9A1 rifle grenade with the T67 cartridge only. Pyrotechnics do not appear to injure the SMG. (Test No. 3)

d. Grenades and pyrotechnics were not stable in flight when fired from the SMG. (Test No. 4)

e. The grenade launcher attached to the M3 SMG increases dispersion when firing either single shot or automatically. (Test No. 5)

5. Conclusions. The Infantry Board concludes that the M3 type SMG is not a suitable weapon from which to project grenades and pyrotechnics.

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6. Recommendations. The Infantry Board recommends that no further consideration be given the project of projecting grenades and pyrotechnics from the M3 type SMG.

INGOMAR M. OSETH,
Colonel, Infantry,
President.

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RECORD of TEST

ON

CARTRIDGE, GRENADE, CALIBER .45, T67;
CARTRIDGE, GRENADE, AUXILIARY, M7

TEST SECTION
THE INFANTRY BOARD

FORT BENNING, GEORGIA

TO: THE DIRECTOR, THE INFANTRY BOARD.
HEREWITH DETAILED RECORD OF TESTS
RELATING TO THE ABOVE PROJECT.

EDWARD B. CROSSMAN
Major, Infantry
TEST SECTION EXECUTIVE

8 Copies.

Copy No. 2 Date JUL 31 1945

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TEST SECTION
THE INFANTRY BOARD
FORT BENNING, GEORGIA

SUBJECT: RECORD OF TEST OF CARTRIDGE, GRENADE, CALIBER .45, T67; CARTRIDGE, GRENADE, AUXILIARY, M7.

TO: THE PRESIDENT, THE INFANTRY BOARD, FORT BENNING, GEORGIA.

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1. Authority and References.

a. Authority:

(1) Memorandum, The Infantry Board, IB-471.94, 14 May 1945. (Appendix "A")

(2) Letter, Office of The Chief of Ordnance, O.O. 471.61/3064, 25 April 1945, with 3 Indorsements and 1 Inclosure. (Appendix "B")

b. Reference:

Field Manual 23-41

2. Introductory Information.

a. The subject blank T67 was designed as a propelling charge to launch grenades or pyrotechnics from the Submachine Gun, Caliber .45, M3. (Figure 1.)

b. In order to project grenades from the M3 Submachine Gun, it is necessary to modify the barrel of the weapon to receive the clamp on the M1 Grenade Launcher (Figure 2 and 3). These dimensions are the same as those on the muzzle of the M1903 Rifle.

The T67 Cartridge for the Submachine Gun, M3, is composed of the metallic parts of the standard Caliber .45 M9 Blank Cartridge and is loaded with the same powder charge as the M6 Carbine Grenade Cartridge. (One grain 60mm Mortar Ignition Powder and 20 grains of IMR-4809 Powder)

The M7 Auxiliary Cartridge is a standard item consisting of a metal case that holds twenty grains of powder.

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a b c d e

a - Caliber .45 Ball Ammunition

b - Caliber .45 Blank T67

c - Auxiliary Cartridge M7

d - M6 Blank for Carbine

e - M3 Blank for M1 Rifle

Figure 1

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a b

Barrel Modification for use of M1

Grenade Launcher.

a - Modified barrel - same dimensions as barrel of 1903 Rifle.

b - Standard barrel for M3 Sub-machine gun.

Figure 2

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M3 Sub-machine Gun with M1
Grenade Launcher installed.

Figure 3

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3. Purpose of Test.

a. To determine the practicability of launching rifle grenades and pyrotechnics from the Submachine Gun, Caliber .45, M3, with and without the Cartridge, Grenade, Auxiliary, M7, specifically:

(1) Ranges and elevations (height of functioning when using pyrotechnics).

(2) Accuracy (dispersion).

(3) Recoil.

(a) Effect on Submachine Gun.

(b) Effect on firer.

(4) Functioning of grenades and pyrotechnics.

(5) Other pertinent data.

4. Details of Tests and Results.

Test No. 1

a. Purpose: To determine the physical characteristics of the subject T67 Cartridge and the M3 Submachine Gun equipped with the M1 Grenade Launcher.

b. Method: By inspection, photographing and weighing.

c. Results: (Figures 1, 2 and 3)

(1) Note the following tabulation:

Type Cartridge	T67	M6	M3	M7	Ball, .45 Cal.
Weight (Grains	105	103	246	103	312
Weight of Powder (Grains)	20.8	19.2	45.4	19.9	5.4

Weight of Weapon, M3 Submachine Gun w/modified barrel -	8.11 lbs.
Weight of Launcher, M1	.5 lbs.
Weight of M3 Submachine Gun w/Launcher	8.61 lbs.

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Test No. 2

a. Purpose: To determine the ballistics of grenades and pyrotechnics fired from the M3 Submachine Gun.

b. Method:

(1) M9A1 and M19 Rifle Grenades were fired from the M3 Submachine Gun using the T67 Cartridge with and without the M7 Auxiliary Cartridge.

(a) Range and dispersion were measured and the average determined.

(2) Mk II Grenades with the M1 Projection Adapter were fired from the M3 Submachine Gun using the T67 Cartridge with and without the M7 Auxiliary Cartridge.

(a) Range and dispersion were determined and the average determined.

(b) The elevation necessary to secure air bursts was determined.

(c) The seating necessary to prevent immediate damage to the weapon was determined.

(3) The height of burst, trajectory or range were determined for various types of pyrotechnics designed for firing from the grenade launcher. Those pyrotechnics not having boosters as an integral part were fired with and without the Auxiliary Cartridge M7.

(4) During the above firing the M3 Submachine Gun was fired from a fixed mount in order to secure accurate comparative data.

(5) The average dispersion of shot groups was determined by averaging the distances to each round from the center of impact of the shot group.

c. Results:

(1) Firing data averaged from 3-round groups:

(See next page.)

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Type Grenade	Elevation (Degrees)	Position (Ring)	Propellant	Average Range (Yards)	Average Dispersion (Yards) Range	Deflection
M9A1	45	6	T67	35	1.5	.3
	45	5	T67	51.6	1.7	.4
	45	4	T67	68	2.0	.2
	45	3	T67	89.7	2.0	.4
	45	2	T67	106	2.0	.3
	45	1	T67	124	12.1	1.1
	45	0	T67	98	7.3	2.0
	40	0	T67	128	16.8	1.7
	30	0	T67	136	8.3	.3
	20	0	T67	88	4.0	1.1
	10	0	T67	56	2.9	.8
	10	0	T67 & M7	89	4.1	.4
	20	0	T67 & M7	153	12.6	.6
	30	0	T67 & M7	207	21.4	3.8
	45	0	T67 & M7	222	2.4	5.1
	60	0	T67 & M7	221	11.3	4.8
M19	43	0	T67	93	3.2	2.5
	43	0	T67 & M7	152	4.7	9.6
Mk II	45	0	T67	108	*	
	45	2	T67	114	**	
	44	0	T67	108	*	
	43	0	T67	108	*	
	35	0	T67 & M7	128	*	

Pyrotechnics (average of 5 rounds)

Signal	Elevation	Seating	Propellant	Height (Yds)	Range (Yds)	Remarks
M17A1	90°	0	T67	152		
T40	90°	0	T67	167		
T12	90°	0	T67	53		2 duds
T8E1	43°	0	T67		177	1 dud

* Fired to secure air bursts at effective elevation. Over 50% air bursts.

**Fired to determine maximum seating to prevent damage to weapon and to secure air burst. Over 50% air bursts.

Test No. 3

a. Purpose: To determine the effect of recoil on the M3 Submachine Gun and upon the firer.

b. Method:

(1) The M3 Submachine Gun was used to fire M9A1 Rifle Grenades from the shoulder, hip and ground using the T67 Cartridge. The effect of this firing on the weapon and firer was noted.

(2) M9A1 and Mk II Grenades were fired from the ground with the M3 Submachine Gun using the T67 and M7 Cartridges. The effect on the firer and weapon was noted.

(3) Pyrotechnics, rifle grenades and Mk II grenades were fired from the M3 Submachine Gun with the gun resting in a mount. The effect of this firing on the weapon was noted.

c. Results:

(1) Grenades fired from the shoulder or hip using the M3 Submachine Gun and the T67 Cartridge deliver a recoil more serious than any of the present Infantry weapons. In many cases the firer's helmet was knocked from his head when firing from the shoulder. Hip firing is not as punishing to the firer as firing from the shoulder. This is due to the fact that the shoulder does not give as much as the arms and the resulting recoil is entirely absorbed by the body. Firing from the ground is not injurious to the firer other than the back blast that is felt in all position. In all firing using the T67 Cartridge there is some tendency of the powder to spit back and cut and burn the firer's hand and face, drawing blood. It was necessary to lower one's helmet to cover the eyes when the direction of fire had been determined and the gun sighted. The back blast and resulting injury to the hands was more serious when using the M7 Auxiliary Cartridge or when pyrotechnics were used which have integral boosters.

(2) Damage to weapons used.

(a) In all cases of firing the M3 Submachine Gun from the ground, the stock was bent (Figure 6).

(b) Permanent damage to the weapon, which was due to excessive recoil of the bolt, was the failure of the guide rod retaining plate and subsequent failure of the receiver of the weapon. (Figures 4 and 5.)

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The following is a tabulation of weapon failures and number of rounds fired:

Gun No.	Type Grenade	Propellant	Seating (Ring)	Fired From	No. Grenades Fired When Failure occurred	Remarks
1	M9A1	T67	0	Ground & Mount	30	*
	M9A1	T67 & M7	0	Ground & Mount	10	Guide rod retaining plate loose and receiver split.
2	M19	T67	0	Mount	8	" " "
3	M19	T67 & M7	0	Mount	3	" " "
4	Mk II	T67	0	Mount	11	" " "
5	Mk II	T67	1	Ground	10	" " "

* Approximately 15 rounds fired from the shoulder or hip without damage to the weapon.

(3) No damage to the weapon was noted during the firing of pyrotechnics from the M3 Submachine Gun.

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Damage to Component Parts of Weapon

Separation of Guide Rods from guide rod retaining plate.

This failure is the final step in rendering the weapon useless.

Figure 4

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Damage to Component Parts of Weapon

Failure of receiver. This failure occurs after the guide rods have been pulled through the guide rod back plate sufficiently to disengage the holes in the receiver and to allow the spreading of the receiver due to the excessive recoil.

Figure 8

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Damage to Component Parts of Weapon

Bent stock due to firing grenades from weapon with stock placed on ground.

Figure 6

Test No. 4

a. Purpose: To determine the stability and functioning of the grenades and pyrotechnics fired from the M3 Submachine Gun.

b. Method: By observation of firing and recording of all malfunctions during tests conducted.

c. Results:

(1) None of the grenades or pyrotechnics was stable in flight when fired from the M3 Submachine Gun. All projectiles had an extreme yaw irrespective of the position from which fired.

(2) The following failures to function were noted:

Grenade or Pyrotechnic	Propellant	Position (Ring)	Number Fired	Duds	Remarks
T12	T67	0	5	2	Did not ignite
T8E1	T67	0	5	1	Did not ignite
Mk II	T67	2	23	4	Did not arm. Twelve armed after striking the ground.

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Test No. 5

a. Purpose: To determine the effect of placing the M1 Launcher on the M3 Submachine Gun on the dispersion of shot groups.

b. Method:

(1) Five 10-round shot groups were fired single shot and automatic at 1000 inches using the M3 Submachine Gun with and without the grenade launcher.

(2) Firing was done from the prone position.

(3) Vertical and horizontal dispersion was measured on each shot group and the average determined.

c. Results:

Average Maximum Dispersion of Shot Groups (inches)

	With Launcher		Without Launcher	
	Vertical	Horizontal	Vertical	Horizontal
Single Shot	8.45	9.32	3.62	2.77
Automatic	8.16	8.51	7.03	4.88

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Test No. 6

a. Purpose: To determine the method of firing the M3 Submachine Gun using the T67 Cartridge.

b. Method: By observation of firing.

c. Results: The only positive method of insuring that the T67 Cartridge would enter the chamber and fire was to place the cartridge in an empty magazine and allow it to feed normally.

Methods of using saliva, dirt or shreads of waste were not dependable in keeping the T67 Cartridge in the gun chamber.

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5. Summary of Facts.

a. The T67, M7 and M6 Cartridges contain approximately the same amount of powder. (Test No. 1)

b. The maximum range of the M9A1 Rifle Grenade fired from the M3 Submachine Gun is 136 yards using the T67 Cartridge with the gun at 30° and the grenade fully seated and 222 yards using the M67 and M7 Cartridges with the gun at 45° and the grenade fully seated. (Test No. 2)

The M19 Rifle Grenade (WP) has a range of 93 yards at 43° with the T67 Cartridge and 152 yards at 43° with the T67 and M7 Cartridges. (Test No. 2)

Mk II Grenades fired from the M3 Submachine Gun using the M1 Projection Adapter can be fired 114 yards using the T67 Cartridge or 128 yards using the T67 and M7 Cartridges (Test No. 2)

The following heights or ranges were recorded when firing pyrotechnics: (Test No. 2)

Type	Height (yds)	Range (yds)
M17A1	152	
T40	167	
T12	53	
T8E1		177

c. The recoil of the M3 Submachine Gun when firing grenades is more serious than any of the present Infantry weapons. When fired from the hip, this recoil was absorbed by the arms. (Test No. 3)

In all firing the firer receives powder burns and cuts on the hands and face, especially when using boosters or the pyrotechnics with integral boosters. (Test No. 3).

d. The M3 Submachine Gun will not withstand the recoil of grenades other than the M9A1 Rifle Grenade and that fired with the T67 Cartridge only. (Test No. 3)

Pyrotechnics do not appear to injure the weapon. (Test No. 3)

Mk II Grenades may be fired from the M3 Submachine Gun using the T67 Cartridge and ring 2 on the launcher. This results in duds and delays arming in most cases. (Test No. 3)

e. None of the grenades or pyrotechnics was stable in flight when fired from the M3 Submachine Gun. (Test No. 4)

f. The grenade launcher increases the dispersion of the M3 Submachine Gun when firing either single shot or automatic fire. (Test No. 5)

g. The best method of firing the T67 Cartridge in the M3 Submachine Gun was to place the cartridge in an empty magazine and allow it to feed normally. (Test No. 6)

WILLIAM S. SINCLAIR, JR.,
Major, Infantry,
Test Officer.

I concur in the above Record of Test:

EDWARD B. CROSSMAN,
Major, Infantry,
Test Section Executive.

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